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1987
Vol. 1

Montana. Office of
the Governor
Site proposal

VOLUME 1

EXECUTIVE SUMMARY

SITE PROPOSAL
SUPERCONDUCTING SUPER COLLIDER

STATE OF
MONTANA

COMANCHE
BASIN

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VOLUME 1
EXECUTIVE SUMMARY

SITE PROPOSAL
SUPERCONDUCTING SUPER COLLIDER

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STATE OF
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BASIN

State of Montana
Office of the Governor
Helena, Montana 59620
406-444-3111

TED SCHWINDEN
GOVERNOR

August 13, 1987

On behalf of the State of Montana and its people, I am pleased to submit Montana's proposal to be the site of the Department of Energy's (DOE) Superconducting Super Collider. I certify that, to the best of my knowledge, the information contained in this proposal is accurate and complete.

If Montana's Comanche Basin is one of the sites on the Best Qualified List, I will call a special session of the Montana legislature to appropriate funds to purchase land needed for the project and to enact any statutory changes needed to facilitate timely transfer of the land to the Department of Energy. These actions will allow Montana state government to move rapidly if Comanche Basin is selected as the final site for the project, meeting all the deadlines for land transfer contained in DOE criteria.

By Executive Order, I will also create an interagency task force comprised of all permitting agencies with a designated state agency leader to ensure smooth and timely coordination of permits needed for the project.

We in Montana strongly support the super collider project and recognize its enormous potential benefits to the United States and the world in the areas of science, technology, education and commerce. We would welcome construction of the project at Comanche Basin.

Sincerely,

TED SCHWINDEN
Governor

VOLUME 1

EXECUTIVE SUMMARY

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VOLUME 1

EXECUTIVE SUMMARY

The State of Montana is pleased to submit this proposal in response to the Department of Energy's Invitation for Site Proposals—Superconducting Super Collider, April 1987. The site that Montana offers, in the Comanche Basin near Billings, was selected after a preliminary evaluation of a number of potentially attractive sites in the state.

Comanche Basin is ideally suited for construction of the Superconducting Super Collider (SSC). This conclusion is based on careful consideration of the Department of Energy's selection criteria and on evaluation of the site by nationally recognized experts experienced in site selection for large facilities. Based on the evaluations presented in subsequent volumes of the proposal, Montana is confident that the Comanche Basin site will fully satisfy the Department of Energy's goal of selecting a site for the super collider that will permit "the highest level of research productivity and overall effectiveness... at a reasonable cost...with minimum adverse impact on the environment."

The proposal was prepared at the direction of Governor Ted Schwinden with funds appropriated by the Legislature and matched by Montana businesses, in a demonstration of public-private cooperation.

A task force of prominent Montanans from government, academia and industry was appointed by the Governor to coordinate and review all proposal work. The task force will remain intact to assist the Department of Energy in future phases of the project.

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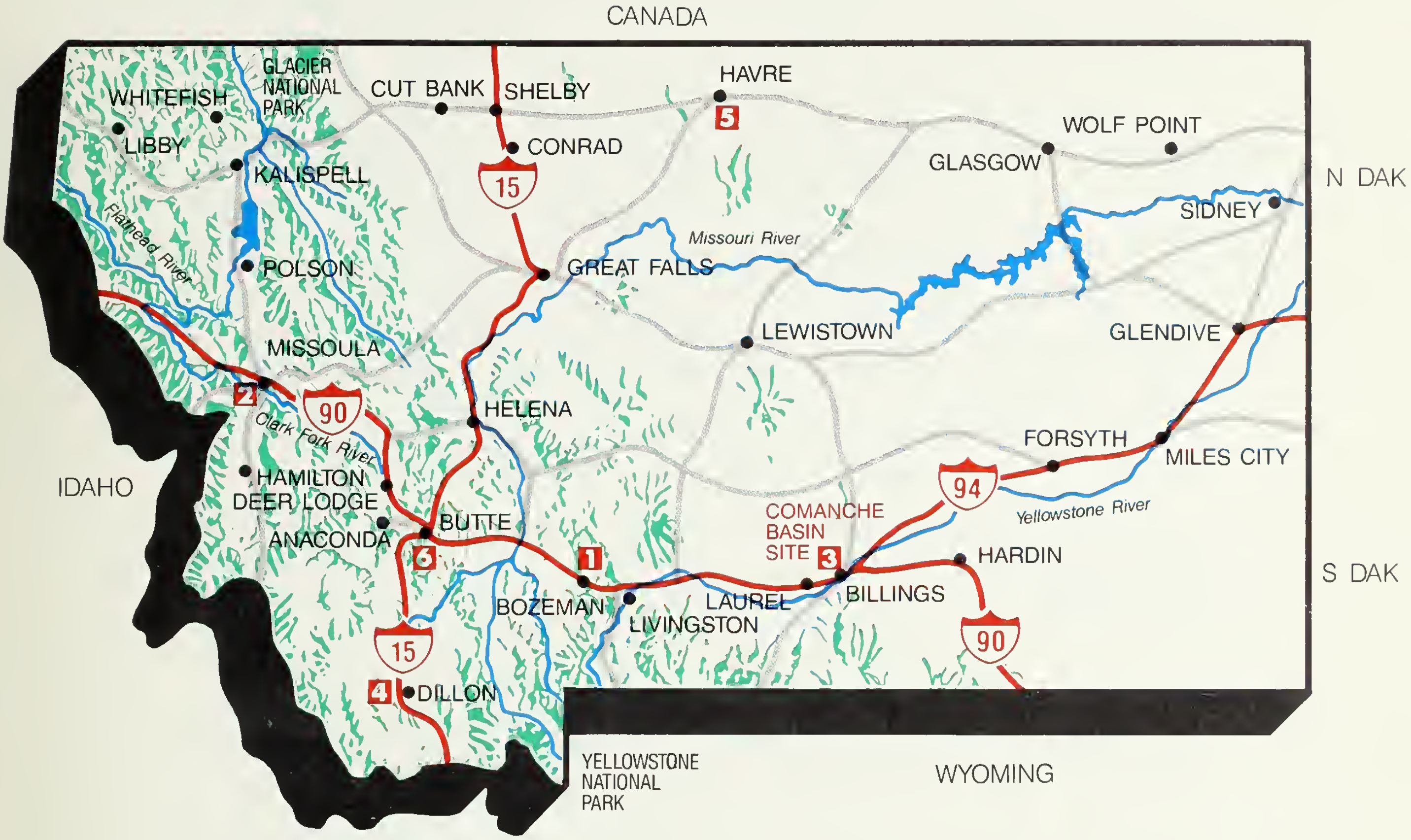
MONTANA


CANADA
GLACIER NATIONAL PARK
WHITEFISH
LIBBY
KALISPELL
CUT BANK
SHELBY
CONRAD
15
HAVRE
5
WOLF POINT
GLASGOW
N DAK
SIDNEY
Flathead River
POLSON
Missouri River
GREAT FALLS
LEWISTOWN
GLENDIVE
MISSOULA
2
90
HELENA
Clark Fork River
FORSYTH
MILES CITY
IDAHO
HAMILTON
DEER LODGE
ANACONDA
BUTTE
6
94
Yellowstone River
COMANCHE BASIN SITE
3
1
HARDIN
S DAK
BOZEMAN
LAUREL
BILLINGS
LIVINGSTON
15
90
4
DILLON
YELLOWSTONE NATIONAL PARK
WYOMING

MONTANA STATE UNIVERSITY SYSTEM

1	MONTANA STATE UNIVERSITY	Bozeman
2	UNIVERSITY OF MONTANA	Missoula
3	EASTERN MONTANA COLLEGE	Billings
4	WESTERN MONTANA COLLEGE	Dillon
5	NORTHERN MONTANA COLLEGE	Havre
6	MONTANA COLLEGE OF MINERAL SCIENCE AND TECHNOLOGY	Butte

Figure 1 LOCATION OF COMANCHE BASIN SSC SITE IN MONTANA

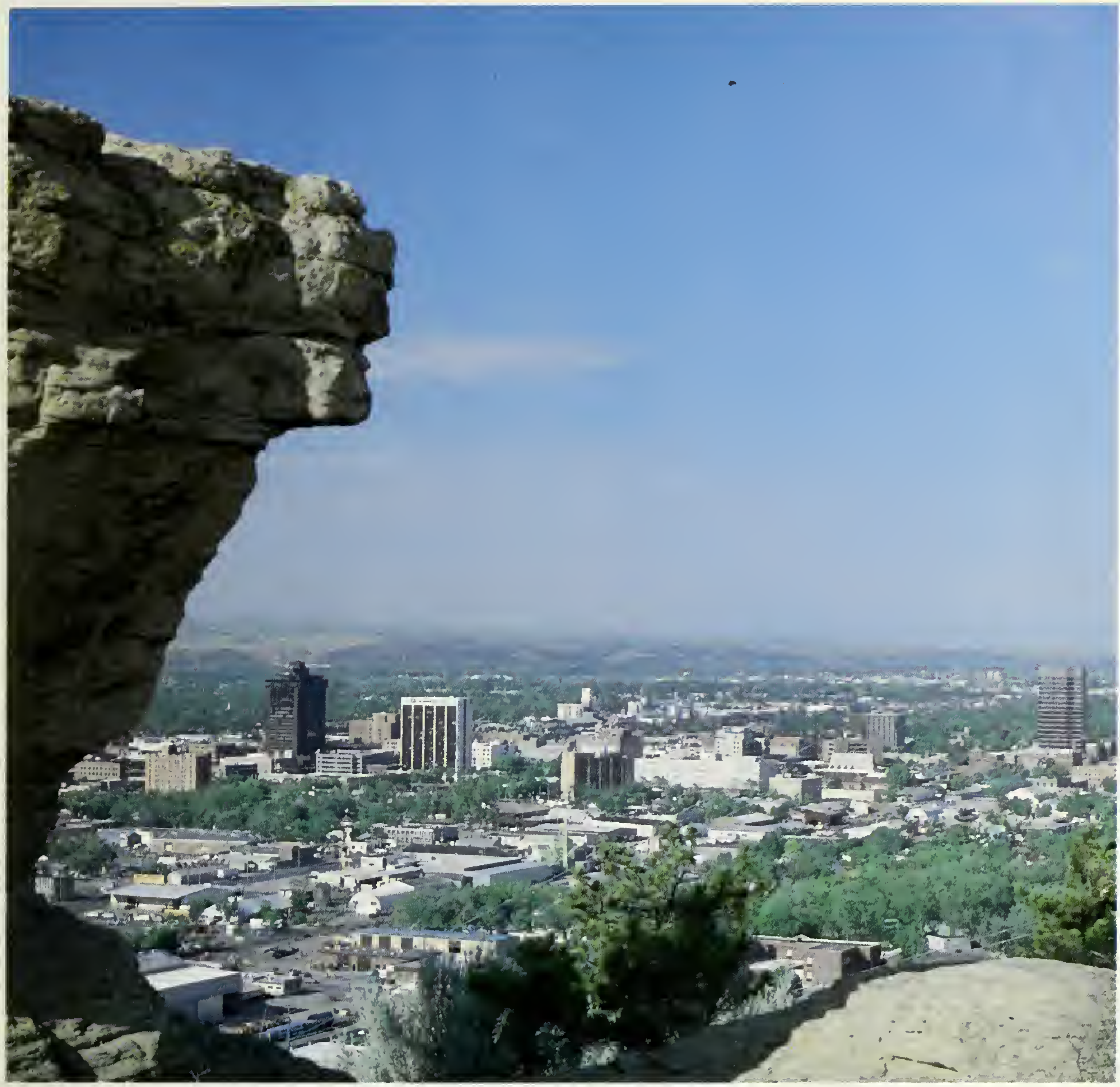
Montana. Safe, uncongested, unspoiled. Big sky country. Montana is the fourth largest state in the Union, yet its total population is less than 825,000. The Billings area, with a population of 120,000, offers all the advantages of any modern city in the West. And although Montana's land area is vast, city dwellers are within minutes of shopping, airports, outdoor recreation and work. The relatively small size of Montana's cities makes it easier for the individual to have a voice in community activities and decision making. People know their neighbors, and children attend neighborhood schools.

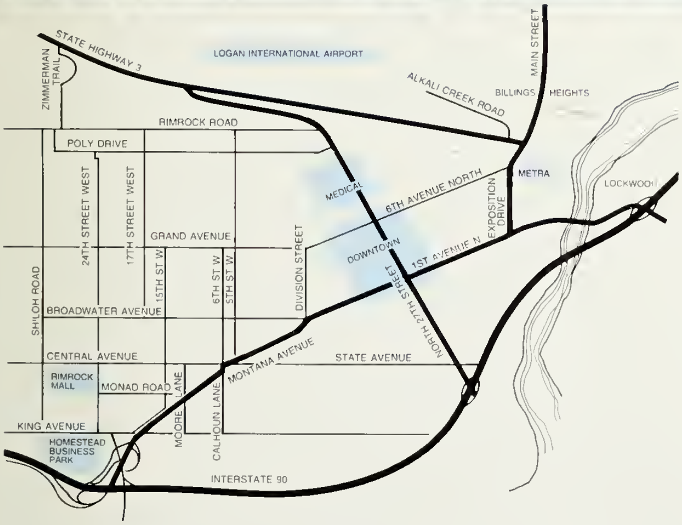
Montana cities offer the advantages of larger cities without some of the disadvantanges. For example, the "rush hour" in Billings, Montana's largest city, lasts only a matter of minutes. Crime rates are low in urban Montana —lower than in most of the surrounding states, and considerably lower than the nation as a whole.

Property values are reasonable. In many respects, Montana's cost of living is lower than that of most other states. Hospital costs in Montana are the second lowest nationwide, and cost of utilities is far below the national average.

Montana also attracts its share of outstanding professional and technical minds—physicians, attorneys, artists, engineers, educators and others. People like to live here.

THE CITY OF BILLINGS




STATE HIGHWAY 3
LOGAN INTERNATIONAL AIRPORT
MAIN STREET
ZIMMERMAN TRAIL
ALKALI CREEK ROAD
BILLINGS HEIGHTS
RIMROCK ROAD
POLY DRIVE
METRA
LOCKWOOD
MEDICAL
6TH AVENUE NORTH
EXPOSITION DRIVE
24TH STREET WEST
17TH STREET WEST
GRAND AVENUE
DIVISION STREET
DOWNTOWN
1ST AVENUE N
15TH ST W
6TH ST W
5TH ST W
SHILOH ROAD
BROADWATER AVENUE
NORTH 27TH STREET
CENTRAL AVENUE
MONTANA AVENUE
STATE AVENUE
RIMROCK MALL
MONAD ROAD
MOORE LANE
CALHOUN LANE
KING AVENUE
HOMESTEAD BUSINESS PARK
INTERSTATE 90

Billings spreads from landmark sandstone cliffs, the Rimrocks, to the historic Yellowstone River.

Figure 2

The Comanche Basin site has many physical characteristics and supporting regional resources that make it an attractive location for the super collider.

Comanche Basin is located in south central Montana on a plain overlooking the Yellowstone River Valley, about twenty miles northwest of the city of Billings. Figure 1 locates the site with respect to Billings, the State of Montana and adjacent states and highlights the six units of the Montana State University System.

Site topography is generally flat with some rolling terrain. Current land use is almost exclusively dryland farming and grazing. Population is sparse in the immediate area. An aerial photograph, Figure 3, taken in June 1987 captures the agricultural character of the site.

The proposed location of the super collider facility is partly outlined on Figure 4, an aerial photograph taken slightly north of the site and looking southeast from an elevation of about 8500 feet above ground level. The farming community of Broadview, population about 120, is visible in the near center of the photograph. The campus area is near the left border. Some low points in the basin contain shallow ponds during wet seasons, as evident from the photograph. Due to low annual precipitation and high evaporation rates, such ponds tend to be transient.

Favorable topography and geology permit nearly ideal setting of the collider ring with flexibility for location refinements. The terrain allows efficient layout of the facility. Flat, or slightly dipping, stable sedimentary bedrock with thin overburden will permit rapid excavation and tunneling and will significantly reduce construction costs and risks.

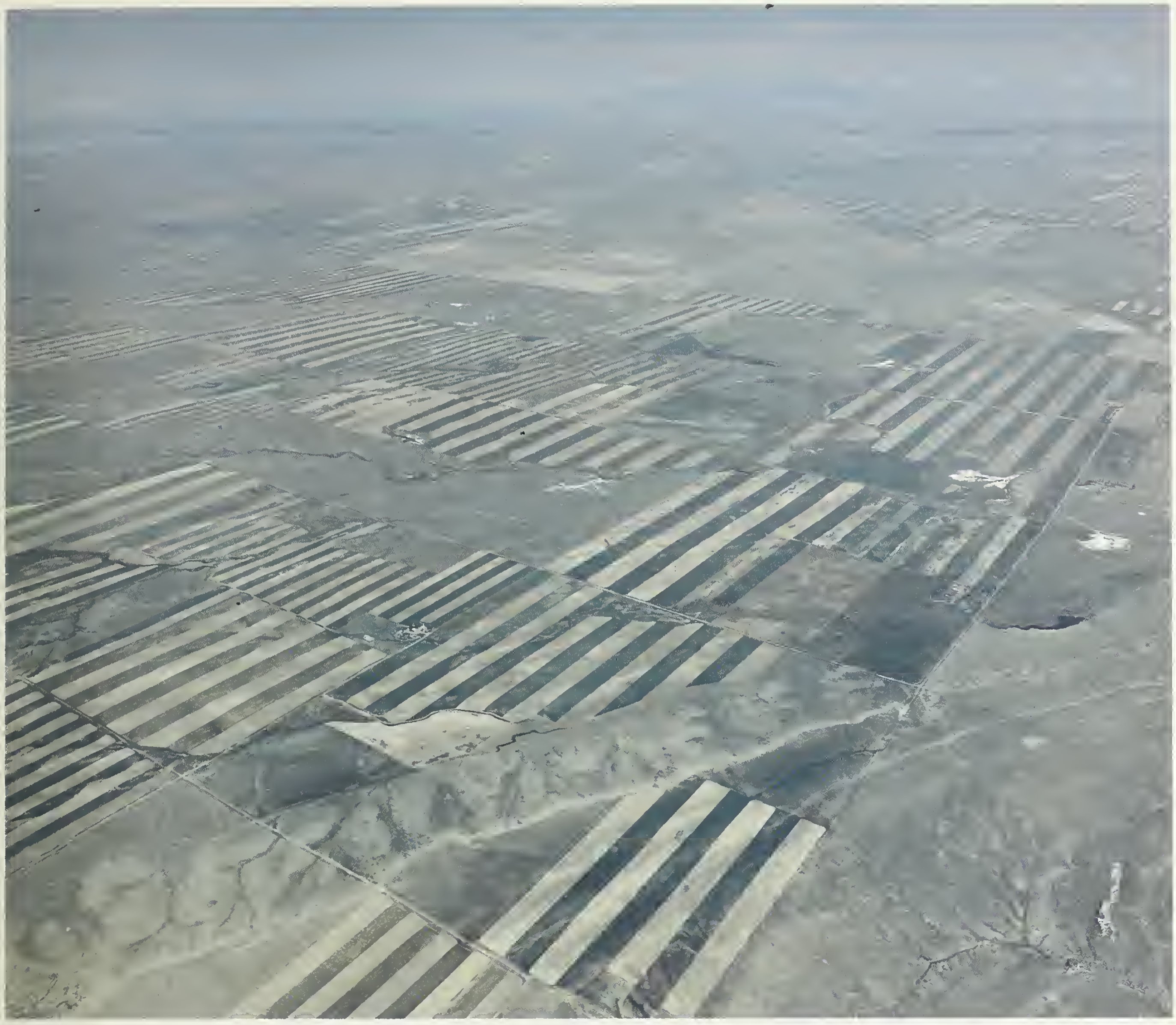


Figure 3 AERIAL VIEW OF COMANCHE BASIN LOOKING NORTHWEST

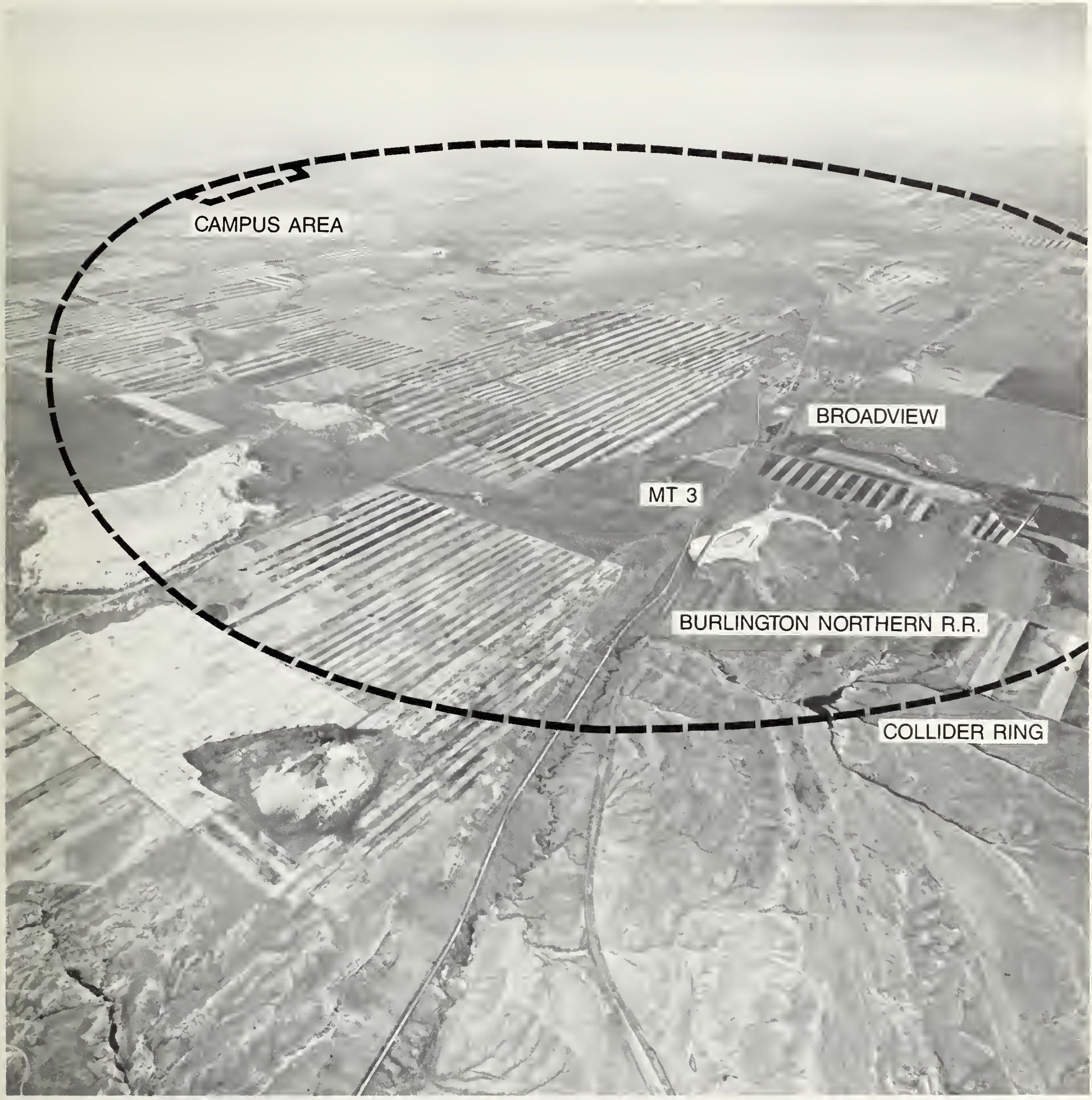

CAMPUS AREA
BROADVIEW
MT 3
BURLINGTON NORTHERN R.R.
COLLIDER RING

Figure 4 AERIAL VIEW OF COMANCHE BASIN LOOKING SOUTHEAST

THE OFFER

The State of Montana will transfer the Comanche Basin site to the United States of America for the superconducting super collider at no cost to the Federal Government and in accordance with all requirements of the Department of Energy's Invitation for Site Proposals. The acceptance period for this offer extends until July 1, 1989, and reasonable extensions will be considered. A summary follows of the land acquisition and transfer plan.

LAND ACQUISITION AND TRANSFER PLAN

Land totaling 16,150 acres, as shown on Table 1, will be conveyed to the Government. Of this total, 8,470 acres will be conveyed in unconditional fee simple. The remaining 7,680 acres in the arc and abort/external beam areas will be stratified estate. Rights-of-way will be provided from existing county roads to the intermediate service and access areas around the ring. Temporary easements will be provided as necessary to facilitate construction.

Most of the land to be acquired is privately held. Discussions with a large percentage of the 70 affected private landowners indicate that purchase is possible in most, if not all, cases. Fewer than ten residences will need to be removed. If possible, private lands will be obtained by donation or purchase. Only if the required estates cannot be obtained by purchase would they be acquired by condemnation. Montana statutes provide for acquiring land by eminent domain for public use.

Eleven parcels of state school trust land are intersected by the super collider. Montana law does not permit the state to donate school trust land to any party, although the state may exchange such lands with the Government. Therefore, Montana will exchange those lands currently held by the school trust for other lands currently held by the Bureau of Land Management. The BLM has advised the State that qualifying BLM lands may be considered trade stock for these state lands. Lands acquired by the exchange will then be transferred to the administrative control of the Department of Energy.

A parcel of land intersected by the project in the north arc is owned by the U.S. Fish and Wildlife Service. Only subsurface estate is required. This will be transferred to the administrative control of the Department of Energy.

Prior to conveyance of title, Montana will execute offer to donate real property as set forth in Appendix G of the Invitation. Rights of Entry will be provided to the Government during proposal evaulation and EIS preparation. Such rights will be extended until transfer of title to the Government is complete.

Table 1 LAND TO BE CONVEYED TO THE GOVERNMENT

AREA	LETTER DESIGNATION	LAND AREA OFFERED (acres)		
		SURFACE	STRATIFIED	TOTAL
Campus	A	350		350
Injector	B	1,700		1,700
Future Expansion	C	1,450		1,450
Collider Arcs	D	380	3,400	3,780
Intermediate Access	E	6		6
Service Areas	F	34		34
East Cluster	G	2,300		2,300
West Cluster	H	1,980		1,980
Abort/External Beams	I	30	4,280	4,310
Abort/External Beam Access	J	240		240
TOTALS		**8,470**	**7,680**	**16,150**

Montana will comply fully with the Uniform Relocation Assistance and Real Property Aquisitions Act of 1970 (PL 91-646). The State has extensive experience with implementation of this act.

Shortly after the Comanche Basin site is placed on the Best Qualified List, the Governor of Montana will call a special session of the Montana Legislature to appropriate public monies to purchase property for the super collider and to enact other amendments to facilitate land transfer.

These amendments will include changes in Montana's eminent domain statutes for timely acquisition of title to property required for the super collider, should condemnation be necessary. Creation of a public or quasi-public corporation for the purpose of acquiring property for the project will also be proposed. This corporation will be specifically authorized and directed by the legislature to engage in activities related to property acquisition.

Legislative support for the project and for the needed legislative action is strong. Over 80 percent of legislative members have given written expression of their support for the project and its funding.

SCHEDULE

A real estate acquisition plan has been developed that will enable the State of Montana to meet the schedule specified in the Invitation for execution of offer, survey, preliminary title evidence and transfer date. Execution of offer for Area A and the first quarter of the collider will occur by April 1, 1989, with transfer of the final quarter and all remaining areas by April 1, 1990. In addition, 100 acres of land in Area A will be made available on January 1, 1989, at no cost to the Government for use by the Department of Energy until title to Area A is transferred.

QUALIFICATION CRITERIA

The State of Montana certifies and demonstrates in subsequent volumes of this proposal that the qualification criteria set forth in Section 3.2 of the Invitation for Site Proposals are met. The evidence to support this certification is summarized below.

The Comanche Basin site is entirely within the United States of America, as shown by Figure 1.

The land size and project configuration proposed will accommodate the super collider facility as specified in the Invitation. Land suitability and configuration conforming to the requirements of Appendix B of the Invitation are demonstrated in Table 1 and Volume 2.

Land for the super collider will be acquired and transferred at no cost to the Government. Details on the offer of land and the acquisition plan are provided in Volumes 2 and 6.

At least 250 MW of electrical power is readily available on site, and an industrial water supply of up to 2200 gpm will be provided at the boundary of the site from the City of Billings via a new pipeline. Evidence to support the availability of power and water supplies is provided is Volume 8.

There are no known unacceptable environmental impacts that would result from siting, constructing, operating or decommissioning the super collider at the site. This conclusion is based on environmental studies undertaken in 1987 and the Preliminary Environmental Evaluation presented in Volume 4.

TECHNICAL EVALUATION CRITERIA

When evaluated against the Department of Energy's technical criteria identified in Section 3.3 of the Invitation, the Comanche Basin site rates high in all categories.

GEOLOGY AND TUNNELING

As a result of natural processes acting over geologic time, Comanche Basin is an ideal site for the super collider. This unique area has special geologic characteristics that make it ideally suited for the facility.

SUITABILITY FOR EFFICIENT CONSTRUCTION OF UNDERGROUND STRUCTURES

Flat site topography, varying only a few hundred feet over an area of some 300 square miles, favors efficient project layout and construction of underground structures. The proportions of the site area, roughly 16 miles wide and 20 miles long, are ideal to accommodate the super collider facility and allow flexibility for location adjustment during final design.

An exploratory drilling program in mid 1987 confirmed that the site's structural geology is simple and straightforward. Bedrock consists of flat-lying or gently dipping Cretaceous and early Tertiary sedimentary formations, predominantly sandstone and shale, characterized as "softrock." There is only a thin alluvial cover in the ring area. Underground structures can be safely and economically excavated in these rock units. Tunneling by tunnel boring machine will advance rapidly. Where tunnel depths are less than 50 feet, approximately 6 percent of the collider ring, cut-and-cover excavation will further reduce construction costs.

Tunnel and structural excavation will generate significant quantities of spoil material, at least two-thirds of which will have properties similar to clayey or silty sand. With the exception of small amounts of high-plasticity clay soils, this material is suitable for structural fill and site grading, thus avoiding off-site disposal costs. Any excess can be used for access roads within an average surface-haul distance of two miles.

The site's geohydrology is well-suited to underground construction and presents minimum water problems. This is due to low rainfall, high evaporation and surface topography that naturally removes water from the collider ring area. Around the ring, the internally drained alluvial cover is thin. The underlying sedimentary formations contain some wells of sufficient capacity for cattle and domestic use. Although moderate groundwater flows will be encountered at some locations during tunnel excavation, extensive dewatering is not expected, based on the relatively low capacity of existing wells.

STABILITY AND SEISMICITY

Although sedimentary formations at the site are relatively soft, they generally exhibit excellent stability, bearing capacity and durability. Rock units in the experimental areas can readily support the required heavy foundation loads without shear failure or significant settlement. No conditions are expected that would result in settlement or ground movement that would adversely affect facility operations.

The site is located in an area characterized by low seismicity within recent geologic time and is defined as Uniform Building Code Risk Zone 1, the lowest category of seismic activity. Since 1869, when the records began, only five recorded earthquake events had epicenters within 100 miles of the site. These events ranged in magnitude from 2.8 to 4.0

Known fault zones occur along the southwest margin of the site area, the largest of which is about 5 miles long. Literature on regional faulting suggests that the latest movement along these zones may have been post Eocene or Pliocene in age. It appears that the most recent mappable movement of the fault zone is on the order of 1.6 million years ago.

INSTALLATION AND OPERATIONAL EFFICIENCY

The collider ring has been placed in a folded plane to make best use of site topography. The east and west interaction points are on horizontal planes at different levels. The west side of the ring is 280 feet higher to accommodate terrain differences and minimize depth to experimental halls and the tunnel. The tunnel arcs are in a plane sloping slightly downward to the east. The average depth from the surface to tunnel center line is about 120 feet, affording installation and operational efficiency.

The tunnel location can be further optimized in both horizontal and vertical dimensions when more detailed topographic and geological data are obtained after Best Qualified List selection.

ABSENCE OF MAJOR CONSTRUCTION RISKS

Flat topography, simple geologic structures, low seismicity and favorable groundwater conditions all combine to substantially reduce the risk of unexpected problems during excavation and tunneling. The 1987 geotechnical exploration program provided information on underground conditions at strategic locations around the facility as well as providing specific properties for each rock unit that will be encountered. Accordingly, major construction risks should be low.

REGIONAL RESOURCES

This region has excellent resources to support construction and operation of the SSC project. As the major trade and service center for the region, Billings offers all supporting services and facilities needed for project construction and for SSC staff, family and visitors.

TRANSPORTATION

Billings has excellent airport, highway and railroad systems. Billings Logan International Airport, largest commercial airport in a five-state area, is twenty-five minutes from the site and four minutes from downtown Billings. Serviced by four international airlines and a regional commuter line, the airport offers connections to cities throughout the U.S. and Canada.

Montana State Highway 3, an established truck route, bisects the site and connects it to the city of Billings. Billings is the meeting point for all primary road systems including I-94 and I-90.

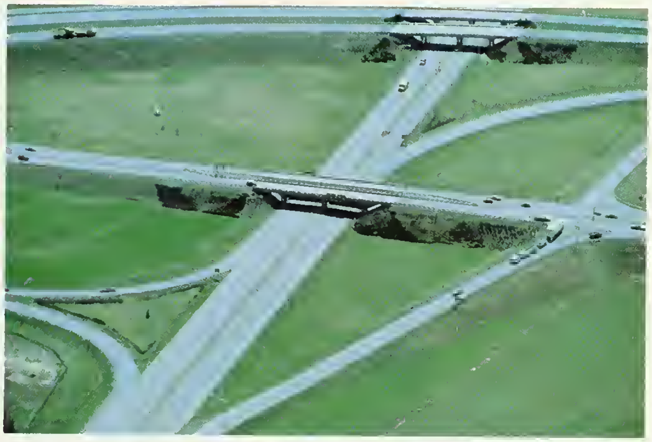
Billings is also an important hub in the extensive Burlington Northern (BN) Railroad network, a Class One rail system that serves 25 states and two Canadian provinces. A newly upgraded BN rail line runs through the SSC site, parallel to State Highway 3.

The airport, highways and railroad, in relation to Billings and the site, are shown on Figure 6.

Excellent air service, just minutes from the SSC site, provides good connections to major cities.

Burlington Northern is the primary transport for Montana grain and coal. BN's welding plant outside Billings is one of the world's most modern.

BURLINGTON
NORTHERN
BURLINGTON
NORTHERN



Interstates 90 and 94 link Billings to major shipping centers.

Figure 5

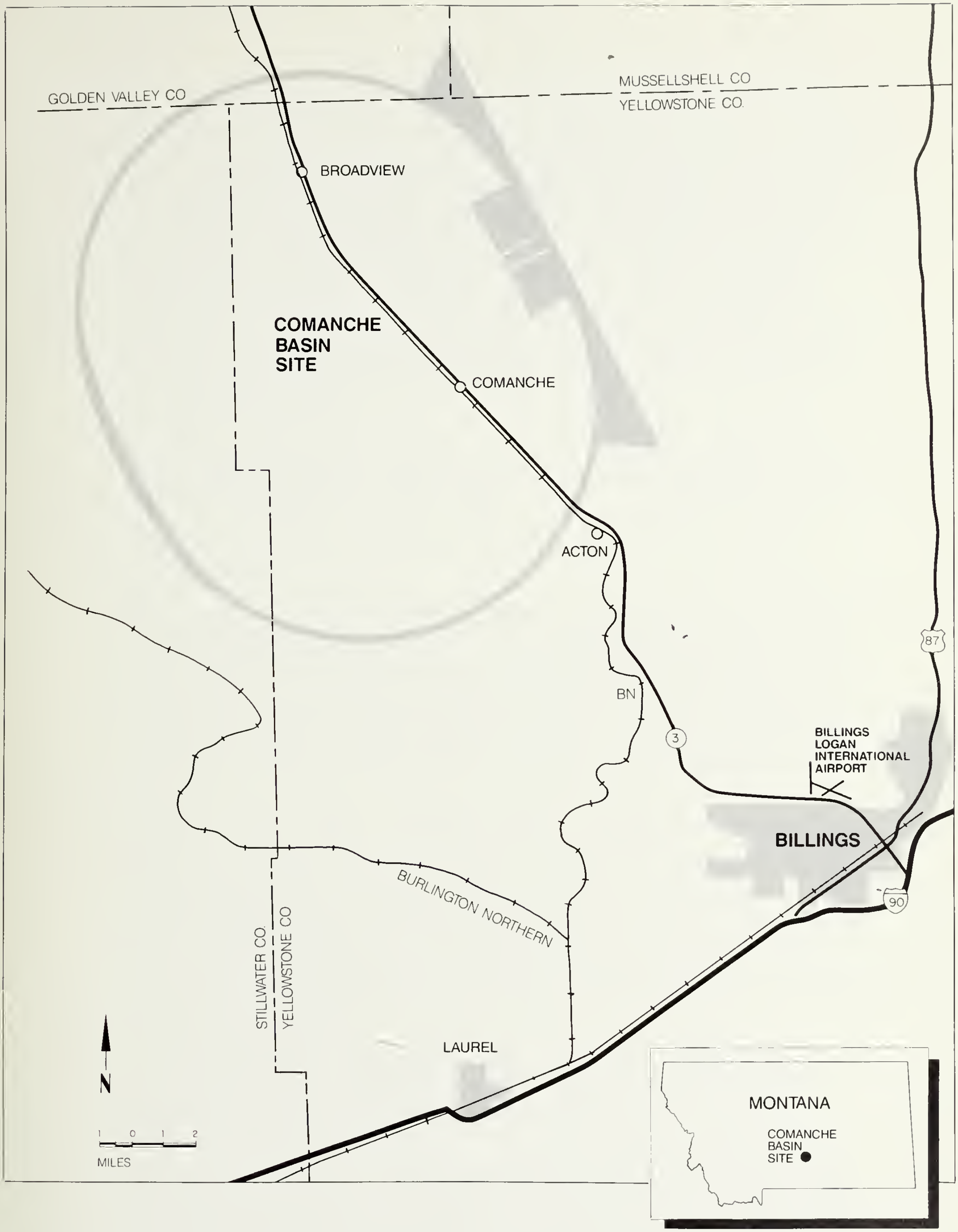

GOLDEN VALLEY CO
MUSSELLSHELL CO
YELLOWSTONE CO.
BROADVIEW
COMANCHE BASIN SITE
COMANCHE
ACTON
BN
3
87
BILLINGS LOGAN INTERNATIONAL AIRPORT
BILLINGS
90
BURLINGTON NORTHERN
STILLWATER CO.
YELLOWSTONE CO
LAUREL
N
1 0 1 2
MILES
MONTANA
COMANCHE BASIN SITE

Figure 6 COMANCHE BASIN SSC SITING AREA

INDUSTRIAL AND CONSTRUCTION RESOURCES

A skilled, experienced labor force of approximately 64,500 and a diversified economy provide Billings with one of the best industrial and construction resource bases in the Northwest. Large-scale mining and construction projects, including construction of four coal-fired generating plants, 200 USAF Minuteman missile sites and major oil and coal exploration operations, are contributing factors to the immediate accessibility of well-developed construction resources and a highly mobile work force. Most of the nation's largest equipment manufacturers and vendors have distribution services and regional warehouses in Billings. High technology firms with experience relating to SSC construction needs are based in the area.

Montana ranks fourth nationally in worker productivity. Montana has competitive base wage rates for construction trades. Montana's overall wage scale is about 12 percent less than the national average.

HOUSING

Billings and the surrounding area have an ample supply of quality rentals and affordable homes within commuting distance of the site. In June 1987, there were 2000 single-family homes and 100 condominiums and townhomes for sale. Approximately 900 multi-family and apartment rental units are available. The average purchase cost of a three-bedroom home in the area is $69,000. Multi-family housing rent ranges from $250 to $400 per month. Single-family housing rent ranges from $300 to $750.

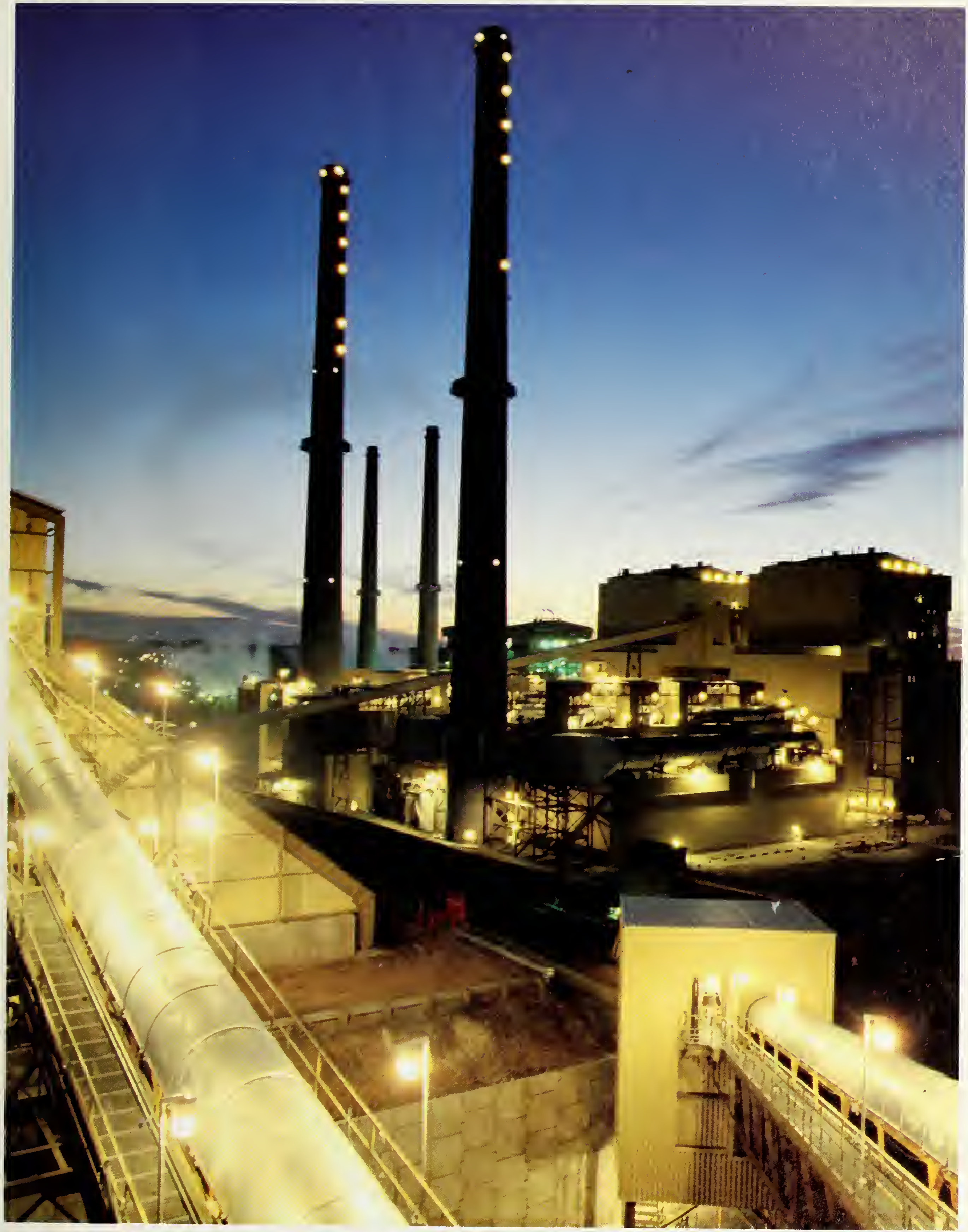
MEDICAL AND EMERGENCY SERVICES

Billings is a medical center, providing advanced health care services to a four-state area. Two modern, fully equipped hospitals (totaling 540 beds), 16 clinics and hundreds of physicians offer every major medical specialty and a complete range of services and emergency care. A helicopter emergency lifesaving program, fully equipped and staffed by a medical flight team, and fixed-wing air and ground ambulances provide advanced life support systems.

Yellowstone County has a comprehensive law enforcement system. The Billings police department has jurisdiction in the city. The Yellowstone County sheriff's department provides service to the remainder of the county.

Fire emergencies in the Billings area are handled by a full-service fire department commended as one of the best units in the Northwest by the Western Fire Chiefs Organization. County and volunteer organizations manage fire-related emergencies for outlying communities.

COLSTRIP GENERATING PLANTS



This $2 billion project, serviced largely from Billings, was under budget from the first definitive estimate and on schedule throughout construction (1970-1986).

Figure 7

RECREATION

The site is only a few hours from Yellowstone National Park, national forests and wilderness areas, and within minutes of a multitude of recreational facilities.

Montanans have the luxury of being able to vacation in the same state where they live and work — even in the winter.

Three of the five entrances to Yellowstone Park are in Montana. The most spectacular, the Beartooth Highway, is close to Billings. It offers breathtaking mountain scenery at every turn.

"The most beautiful road in America is U.S. 212 which leaves Red Lodge, climbs to the Beartooth Pass at 11,000 feet and drops down into the northeast entrance of Yellowstone Park...Hearst would have built his castle on the Red Lodge-to-Cooke City highway if he'd have known about it." *Dateline America, 1979, CBS, Inc., Charles Kurault.*

Billings takes advantage of the outdoor action. You can tell a lot by what's on top of cars — rafts, skis, camping gear, bikes, canoes, trophy elk. Or, what they're trailing — snowmobiles, horses, sailboats, speed boats. Golf clubs are in the trunk.

EDUCATIONAL AND CULTURAL RESOURCES

Montana public schools are among the best in the nation in terms of student achievement and quality of education. Overall, the state's education system ranks third in the nation and has received high marks nationally in scholastic achievement. The six-unit Montana University System and community education programs have produced an educated, skilled population. Research is an integral part of the university system. The Montana Science and Technology Alliance, a joint economic partnership between the state and the private sector, is designed to strengthen Montana's business climate through investments in research and development.

The Montana Legislature has authorized the Science and Technology Alliance to create "Centers of Excellence" linked to the University system. The Alliance and the University System have, in turn, designated the Comanche Basin site as a candidate location for such a center if the SSC is located there.

The state fosters a rich cultural environment with a wealth of events ranging from performances by internationally acclaimed classical musicians to traditional pow-wows by one of the Indian tribes in the state. Music, theater, art, dance, opera and ballet are established cultural offerings in the Billings area.

REGIONAL RESOURCES

Pack trips head deep into the Beartooth Primitive Area.

Yellowstone National Park.

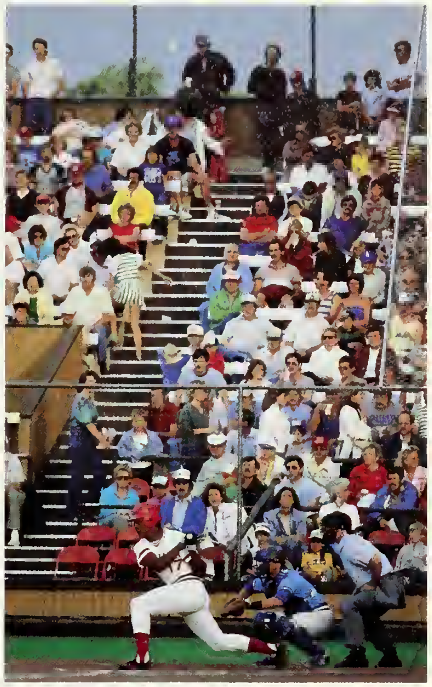
Fly fishing is excellent on Montana's blue-ribbon streams and rivers.

Montana Indians contribute to a rich heritage.

Billings skiers can be on Red Lodge Mountain in an hour.

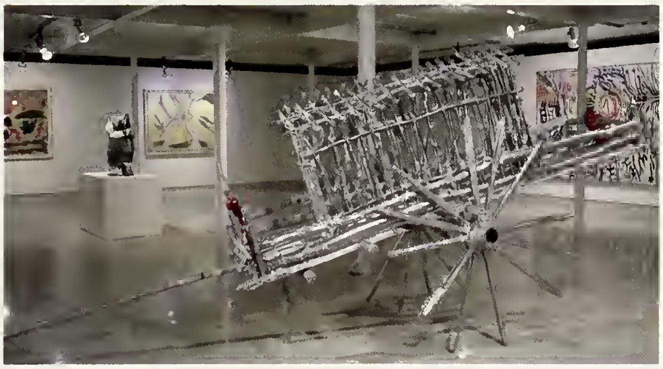
Metra seats 12,000 for big name entertainment, rodeos, trade shows.

The Billings Symphony Orchestra plays in the new Alberta Bair Theater.



Everyone enjoys a Mustang game.

The HELP helicopter takes off from the medical corridor.



Each year, the Yellowstone Art Center presents over twenty contemporary and historic exhibitions.

Montana State University, Bozeman, is one of six units of the state university system. Eastern Montana College and private Rocky Mountain College are in Billings.

Newest of six golf courses in Billings.

COMMUNITY AND NON-FEDERAL GOVERNMENT SUPPORT

The proposed site has received strong support from communities throughout Montana. Letters and resolutions expressing approval have come from every community in the vicinity of the site, with local governments pledging full cooperation with SSC officials in accommodating the needs of the project. Resolutions assuring necessary improvements and expansion of facilities are on file from the State of Montana, various departments within state government, and city and county governments in the vicinity of the site, public organizations, and key private business entities. Copies of all resolutions and letters of support are included in the Appendix to Volume 4.

To support the SSC's environmental compliance and regulatory requirements, the State of Montana has made a commitment to establish a single-stop permit office upon designation to the Best Qualified List. This permit office will provide sufficient information for the Federal EIS record to ensure that it fulfills Montana's Environmental Policy Act (MEPA) requirements and is adopted by the state so that MEPA compliance will not delay issuance of state and local permits. The office will work with the DOE and affected federal, state and local agencies in coordinating environmental reviews and expediting the project's permitting process.

No payments in lieu of taxes will be imposed on the SSC project or the DOE. Government property and the income from its use are exempt from taxation in Montana. As a federal research project, the SSC is also exempt from the Montana public contractors' license tax.

ENVIRONMENT

Based on the Preliminary Environmental Evaluation, the impacts from siting, constructing, operating and decommissioning the SSC would be relatively insignificant due to the nature of the existing site environment and land use. The site vicinity does not support any known federally listed threatened or endangered species. Because the site ecosystem is not unique, it will be possible to comply with appropriate environmental requirements within reasonable limits of time and cost. In cases where mitigation of adverse environmental impacts is necessary, such mitigation can be accomplished.

WETLANDS

The U.S. Geological Survey 1:24,000-scale topographic maps show no marshes within the site. Other small surface water bodies in the internally drained basin do exhibit some features characteristic of wetlands (see Figure 5.2-1). These water features may constitute wetlands as defined by DOE in its regulations implementing Executive Order 11990—Protection of Wetlands (10 CFR 1022 et seq). Confirmation of the type and location of wetlands will be completed as a part of the wetlands assessment portion of the project's EIS process.

SURFACE WATER

The SSC facility would be located largely within the drainage of the Comanche Basin, with portions of the SSC ring intersecting ephemeral streams on the fringes of the Lake Basin and Painted Robe Creek watersheds to the west. Maps indicate 399 miles of intermittent streams and 25 miles of perennial small streams in the Comanche Basin. The low ratio of total stream distance to surface area of the basin, 1.84 miles/per square mile, indicates the relative aridity of the basin. The intermittent streams carry water when runoff is heavy, usually during spring. Approximately one year in ten, heavy runoff causes minor flooding of some streams.

Surface water samples were taken in the summer of 1987 from four small ponds and a stream in the site area. Tests on these samples indicate high pH and high total dissolved solids (up to 8000 mg/L) in the surface waters of Comanche Basin. These results are consistent with soil conditions, drainage patterns and climate of the area.

FISH AND WILDLIFE

Overall, the Comanche Basin area is not considered to be a unique or uncommon wildlife habitat; similar habitat exists in abundance in the region. The surface water resources and vegetation in the vicinity of the site provide habitat for a moderate range of wildlife species. Agricultural activities have altered the natural habitat and influenced the kinds and numbers of wildlife species.

Pronghorn antelope and mule deer are the predominant big-game species. There are no antelope wintering areas in the vicinity. Mule deer tend to inhabit the wooded areas and broken side slopes of drainages to the east of the site. This area, outside the site perimeter, has been identified in a 1974 study as critical mule deer habitat. More recent studies have not identified any mule deer winter ranges or year-long high density areas near the proposed site.

The most prevalent predators in the region include the coyote, bobcat, lynx and red fox. Their incidence at the proposed site is unknown. Numerous small mammals include the jackrabbit, cottontail rabbit, prairie dog, ground squirrel, and many small rodents, such as the western deer mouse.

Sage grouse are the most widely distributed and abundant game-bird species. They are primarily associated with the sagebrush communities in the grassland basin and in the pine forested area east of the site. Sharp-tailed grouse can be expected to concentrate near the ridges bordering the Comanche Basin to the east. Introduced game-bird species may occur in the area.

In wet years, Comanche Basin surface water features may attract waterfowl populations close to 100,000 for breeding and stopovers. In dry years, waterfowl breeding is limited and populations total in the hundreds. The largest breeding area within the proposed site is the Spidel Waterfowl Production Area, three miles northeast of Broadview, administered by the U.S. Fish and Wildlife Service.

Other wildlife in the general area includes raptors, such as golden eagles and red-tailed hawks, and numerous species of passerine birds. Various reptiles and amphibians inhabit the site area.

One study of the area concluded that "the temporary ponds and marshes in the area...do not support a fishery of any importance." Any fish are likely to have been stocked. The Montana Department of Fish, Wildlife and Parks indicates that their only fishery in the area is Broadview Pond, which they plan to manage as a bass-crappie fishery.

VEGETATION

Comanche Basin is characterized primarily by mid-grass prairie, with some wetland vegetation in lowland areas and ponderosa pine cover on the rock outcroppings and broken drainage slopes outside the site's eastern perimeter.

AIR QUALITY

Sources of air pollutants in the site area include agricultural activities which generate particulates. Petroleum refineries and a coal-fired power plant in Billings emit sulfur dioxide, nitrogen dioxide and particulates. The Billings sources are downwind twenty miles to the southeast of the site. Dispersion modeling conducted by the State of Montana Air Quality Bureau for the Billings area indicates that no significant concentrations of any regulated pollutant should occur at that distance from Billings.

BACKGROUND RADIATION

The sedimentary rocks underlying the Comanche Basin contain very small amounts of radioactive elements that contribute to the low background radiation observed. There are two geologic formations under the Comanche Basin that may contain slightly elevated concentrations of uranium and other radioactive elements. These formations are the Bearpaw Shale, which locally contains deposits of bentonite, and the Virgelle Sandstone, a favorable environment for ''Texas'' roll-type deposits that may contain uranium concentrations.

HISTORICAL AND ARCHAEOLOGICAL RESOURCES

The Montana State Historic Preservation Office (SHPO) has identified 85 prehistoric and historic sites, mostly tipi rings and lithic scatters, within the general region of the proposed SSC site. Only one of the recorded sites, a log hotel which once was the Antelope Stage stop on the historic stage route from Billings to Lavina, is listed on the National Register of Historic Places. It can be incorporated within the campus expansion area.

The area has not been extensively or systematically surveyed to date and other sites may exist. SHPO believes that the recorded sites are probably representative of the range of site types that occur there. Most of the cultural resources at the recorded sites are relatively common to the general region.

TITLE DELIVERY

The State of Montana has prepared a real estate acquisition plan that will deliver defendable title to the Government within the required schedule. Over 250 landowners in the general site area have been identified and their property boundaries located. However, land must be acquired from only 72 landowners, including the State of Montana and the Federal Government. Most of the resident landowners have indicated a willingness to discuss purchase of their land for use by the project.

For lands currently owned by the State, land will be exchanged with the Bureau of Land Management for subsequent transfer to administrative control of the DOE. For land privately held, a public or quasi-public corporation will be established with power to acquire land for the super collider and transfer it to the Government. A special session of the Legislature will be held, early in 1988, to facilitate land acquisition and transfer.

FLEXIBILITY

Favorable site topography, geology and land use allow flexibility to adjust the location of SSC facilities on the site.

NATURAL AND MANMADE FEATURES

There are no natural features in the region of the site that will adversely affect siting, construction or operation of the facility. To the contrary, the natural characteristics of the site favor efficient site development.

Principal manmade features in the site area are electrical transmission lines, the Broadview substation, the BN rail line, Highway 3 and a system of county roads, generally at one-mile spacing on section lines. These features are all assets in site development and access.

The city of Broadview, located inside the north arc, and scattered ranches throughout Comanche Basin will not appreciably affect project operation. Billings, twenty miles to the south, will not cause interference.

NOISE AND VIBRATION

The only potential sources for noise and vibration in the area are Montana State Highway 3, the Burlington Northern Railroad and agricultural equipment. The highway and rail line would be at least five miles from the SSC interaction points and should not adversely impact operation.

CLIMATE

There are no known climatic conditions that could adversely impact construction and operation of the SSC at Comanche Basin. The area's climate is mild compared to cities of similar latitude to the east (e.g. Chicago, Minneapolis). The Billings area frequently has mild, ''open'' winters when arctic cold bypasses the area completely.

Snow accumulations over six inches are uncommon. Local roads and airport facilities rarely close. For example, Montana State Highway 3, the major access route to the site from Billings, has been closed due to snow only two hours in the last twenty years.

Summers are warm, sunny and dry. Skies are blue. Average annual precipitation is about 15 inches. Humidity is low—the July daytime average is 35 percent. The sun shines 219 days a year.

UTILITIES

RELIABLE AND STABLE POWER SUPPLY

The site area is served by Montana Power Company (MPC), a utility with an excellent balance of hydroelectric and coal-fired generation and firm power purchase agreements. In 1986, MPC's peak generation was 1,233 MW, 73 percent of its capacity. In addition, MPC is interconnected by two 500 kV transmission lines and a number of 230 kV lines to large electrical supply systems in the Northwest.

The Broadview substation, inside the collider ring and six miles from the campus area, interconnects seven major transmission lines 230 kV or higher, any one having the capacity to provide full-load service to the SSC. The two 500 kV lines connect the 2,060 MW Colstrip generating station and the Bonneville Power Administration's Garrison switchyard 225 miles to the west. The 230 kV lines connect Great Falls and Billings. Because of these interconnections to large power generation facilities and transmission line redundancy, the collider site could not be placed in a more stable and reliable location for power supply.

MPC expects load growth of about 1.8 percent over the next nine years without consideration of the SSC. MPC plans to build a 240 MW combined-cycle unit at its Mill Creek substation to respond efficiently to future load demands, including the SSC. Based on the addition of this unit, the estimated cost of energy delivered to the site is 34 mills/kWhr in 1987 dollars.

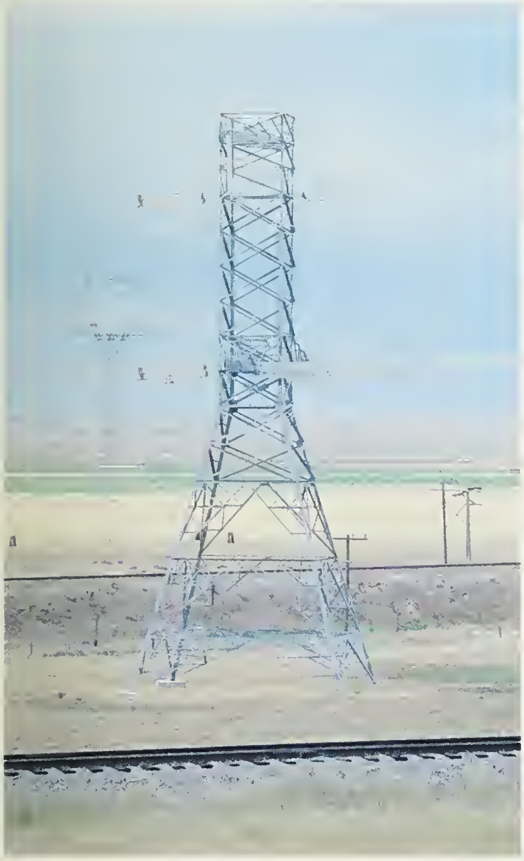
RELIABLE WATER SUPPLY

Water for the SSC will be delivered to the southeast perimeter of the collider, about ten miles from the campus, through a new 16-18 inch pipeline from the Billings city water service. The pipeline and pumping station, with a capacity of 2600 gpm, will be constructed through a Rural Special Improvement District.

Billings has a reliable and abundant water supply from the Yellowstone River. The city has in place more than adequate treatment and supply capacity to satisfy the SSC industrial cooling and potable water needs. Further treatment at the site should be minimal and relatively inexpensive, since the water already meets drinking water standards.

The Yellowstone River will provide abundant potable water through the Billings city water system.

Broadview substation is within the collider ring.



Highly reliable 230kV and 500kV transmission is on site.

AVAILABLE FUEL AND WASTE DISPOSAL FACILITIES

Fuel for the SSC will be provided from a new natural gas pipeline from the Montana Power Company system. A new 4 inch branch line off the existing 6 inch Big Coulee line will be run through the town of Broadview to the east cluster. A 2 inch branch line will be run from the 4 inch line south to a pressure-reducing/metering station at the west cluster. The company has long-term reserves and supplies under contract adequate for SSC requirements well into the future.

Adequate sewage treatment facilities do not exist within a practical distance of the site. A treatment plant will need to be constructed by DOE. Several locations exist near the campus for siting an evaporation pond for treatment of effluent combined with cooling tower blowdown.

Billings operates a solid waste landfill south of the city with capacity estimated to be adequate for both city and SSC needs through the year 2010. Contractor-operated waste disposal trucks are available for hauling material to the landfill. Low-level hazardous waste can be trucked to a licensed site in Colorado or Utah. A firm specializing in transport of this material is headquartered in Billings.

APPENDIX

ACKNOWLEDGEMENTS

The State of Montana's proposal for the superconducting super collider site was prepared under the supervision of the Governor's Task Force, whose members are as follows:

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